Asia Minor, was never represented as a virgin; she figured always as a mother and her body bristled with secondary nipples. She was the nurse of all earthly beings, and from the lower part of her abdomen and thighs emerged the heads of stags, bulls, lions and other beasts.

Vedic mythology tells of savage combats waged by the Hindu god, Indra, against the powers of darkness for the ownership of the heavenly cows, whose breast milk watered and fertilized the earth. Their breasts were the billowing clouds and their milk the life-giving rain. Many other divinities of antiquity were represented as having not two, but many breasts. Isis, Aphrodite and Ceres belonged to this group, presiding over the fecundity and the food of the children of men.

The artists of the early Egyptian dynasties pictured woman as the possessor of insignificant breasts; by the days of the twenty-sixth to thirtieth dynasties, however, the glands were again shown as greatly enlarged and covering the whole front of the chest. This exaggeration was also a feature of Ægean art and was increased by the wearing of massive corsets which constricted the waist and produced a condition of steatopygia. From archaic Greek art we have a legacy of statues draped in some clinging material which allows the form of the breasts to be clearly outlined. Here the breasts are under-developed and are kept apart by a species of baldrick or cross-belt. It is remarkable also that the nude statuary of this time also represents the female mammary glands as small and widely separated. What is still more curious is that certain sculptors of this epoch show the male breast as greatly hypertrophied, the condition known today as gynæcomasty. Certain such examples are to be seen in the Louvre and in the Uffizi Gallery at Florence. In the age which followed, Greek art reached its apogee in the work of Phidias and Praxiteles. These men showed the female form in its most beautiful and natural aspects. The later Græco-Roman school saw a change in taste in which a desire for realism went so far as to admire the shrunken and wrinkled breasts of old age.

With the advent of Christianity an army of pagan divinities vanished at one blow. The new religion launched an attack at once upon her whom it considered the most dangerous: Venus, the naked woman, the cause of original sin. The body of Eve was early pictured and described as asexual, its outlines identical with those of Adam's figure. The breasts of both were slack and limp. The wish to make woman ugly is also found in a debased form in Byzantine art. With the foundation of religious orders the rules of morality were strictly enforced; sculptors were made to illustrate in stone the penalties of sin, particularly of those attaching to the lusts of the flesh. Thus may be explained the toads, dragons and serpents which are to be found attacking wrong-doers, and particularly the nipples of wrong-doers, in many ancient churches and cathedrals. And yet in many religions milk has been regarded as having miraculous powers. When Juno suckled Hercules she allowed a drop of milk to fall and thus the Milky Way was formed. For the Hindus all things had their beginning in a sea of milk. Ancient Christian mythology regarded milk as the symbol of purity, a life-giving fluid capable of succouring those at the point of death. There are many examples in stone of saints and martyrs who so fed and saved the lives of the faithful.

All who have seen reproductions of the pictures will remember the opulent breasts of Rubens's sitters, and the overwhelming paintings of Joardens and Steen. In eighteenth century England women wore gauzy, light dresses plainly revealing the wearer's outlines. A caricature of 1796 shows "the fashionable mother, or the convenience of modern dress". The drawing depicts a woman of fashion who, on the point of leaving for some social gathering, is hastily feeding her child. Her breast protrudes from a pouch in her dress, the infant being held in a suitable position by a servant.

We have seen that in prehistoric times breasts were shown as of enormous proportions and were symbols of fecundity and reproduction. Much Greek and Roman art did honour to the young girl and the young married woman. The art of the middle ages looked upon the breast not only as the emblem of maternity, but of vice. Then came a long period during which, though artistic conceptions varied in details, the breast was shown in a position more or less correct anatomically and more or less true in proportion. Before the Great War it was held desirable for women to be soft and rounded in form—a fashion which shows present signs of a renascence. But after 1914 conceptions of masculine bravery led women themselves to prefer masculine outlines, to cultivate flat breats and to become devotees of the cult of "slimming". Dr. Leonard Williams relates that when the cult of the curveless figure was at its height a young woman demanded that a surgical friend of his should amputate her breasts, which were perfectly normal. When the surgeon very properly refused, the young woman assured him that two of her friends had had their breasts removed. Dr. Williams also comments upon the fact that it is not uncommon for reputable French surgeons to remove parts of the large breasts which are so common among certain European women at the menopause. These operations have been described in French medical journals of the first rank, and one such article shows an illustration of an instrument devised by the author for the transplantation of the nipple into a new position. Such operations cannot yet be said to be common or popular in the surgical world of Anglo-Saxon countries. Some such procedure might have been justified in the case of Anne Boleyn, who, according to historical report, had three breasts. Catherine de Medici was another famous woman similarly endowed. She was the possessor of an accessory breast in the inguinal region and is said to have designed a special dress for its proper display.

XUM

Abstracts from Current Medical Literature.

PÆDIATRICS.

Artificial Pneumothorax in Children.

Christopher Rolleston (*The British Journal of Children's Diseases*, April-June, 1936) reports five cases of artificial pneumothorax in children, whose ages ranged from thirteen to fifteen years. In one patient pregnancy occurred as a complication of the course of treatment three years after the pneumothorax had been induced. She was delivered of a healthy child and her general condition remained excellent. She gave birth to a second child five years later and continued in very good health. In another patient tuberculous glands, which formed abscesses requiring surgical treatment, complicated ulcerative pulmonary disease. When seen thirteen years after treatment she was a healthy-looking young married woman, the only sign of disease being blowing breath sounds under the right clavicle. The author concludes that in unilateral disease artificial pneumothorax is as applicable to children as adults, and the tendency to effusion seems less than in patients over twenty years of age, few of whom escape effusion of some degree.

The Treatment of Chorea.

Harry R. Litchfield, Joseph Gillman, Ellis H. Harris and Benjamin B. Cohen (*Archives of Pediatrics*, April, 1936) review the treatment of chorea. They draw attention to the variable results obtained by drug therapy. The pathology of chorea is not known, although the central nervous system and motor areas of the cortex are most likely the seat of the morbid processes. The authors review the literature in regard to "Nirvanol" therapy and draw attention to the dangers and limitations in the treatment of chorea with this drug. They report a definite improvement in the condition of a girl of eleven years with chorea who was treated with "Luminal", a start being made with 0·03 gramme (half a grain) three times a day, and the dosage being gradually increased until she was taking 1·32 grammes (22 grains) a day. She was on this medication for a month. The authors consider that typhoid vaccine therapy has given them fairly good results, and they report a series of eight patients treated by this method. In practically every case the results were very encouraging and the improvement more rapid than by other methods. Sedatives had been tried in most of these cases without any effect. "T.A.B." vaccine was used; a dose was given each day for seven to nine days, about 0·05 cubic centimetre being used as a primary dose and 0·8 cubic centimetre as a final dose. A sharp rise in temperature resulted from most of the doses, followed by chills and a drop of the temperature to normal.

The Shoulder Sign.

Samuel M. Weingrow (*Archives of Pediatrics*, June, 1936), in the course of his investigation of the scapular reflexes, felt that the multiplicity of muscular reflex associations in the regions of the shoulder might offer something of diagnostic importance. After observing the reactions obtained by tapping the shoulder of normal patients and of patients suffering from disease of the pyramidal tract, the author became convinced of its value as a sign of pyramidal tract disease. To obtain the reflex, the arm, forearm and hand are kept in their normal position, but preferably at rest in the patient's lap. Tapping of the acromial end of the scapula or the coracoid process produces a slight flexion of the forearm and a slight internal rotation of the hand. This type of reflex reaction should be of particular interest to the pædiatrician, because the Babinski toe sign is elicited in the normal child up to six years of age, and there may be doubt as to the result of the test. There is, furthermore, a great deal of disagreement among authorities as to what constitutes a Babinski sign. Case reports are given illustrating the value of the shoulder sign.

The Oral Administration of Pituitary Extract.

Louis A. Lurie (*Archives of Pediatrics*, June, 1936) reports two patients with *dystrophia adiposogenitalis* who were treated with pituitary extract given by mouth with striking results. Two grains of desiccated whole-gland pituitary were administered three times a day for a period of six to twelve months. In neither instance was the patient given a rigid diet, restriction being made only in carbohydrates and fluid. The author points out that an impression has become widespread that, with the exception of thyreoid extract and possibly theelin, none of the glandular preparations is efficacious when given by the mouth. This attitude may simply be a reaction to the extravagant and irresponsible claims made by various pharmaceutical houses; or it may be that many investigators feel that when glandular products are given by mouth the active substances are either destroyed by digestive secretions from the gastro-intestinal tract or are not absorbed. The case reports show what may be accomplished through the oral administration of extract of pituitary gland in properly selected cases without recourse to drastic limitations of caloric and fluid intake. Both patients (boys) lost in weight, and their desire for food, especially carbohydrates and water, returned to normal. The headaches disappeared. Pubertal changes were brought about. Their sluggishness and general phlegmatic attitude disappeared, and they became mentally more alert. Further, it was observed that withdrawal of the medication was as a rule followed either by a gain in weight or a failure to lose in weight. Finally, it is pointed out that poor diagnosis as well as poor and ineffective preparations have been responsible in many cases for failure to obtain good results with organotherapy.

Skin Tests in Rheumatic Fever Children.

Valentia P. Wasson (*Archives of Pediatrics*, May, 1936), in the course of routine investigation of every new case of rheumatic fever referred to the Fifth Avenue Hospital Clinic, has studied the results of skin tests done to determine the sensitivity to hæmolytic streptococucs nucleoproteins. The test was done by injecting 0·1 cubic centimetre of the material intradermally into the flexor surface of the forearm. The result was read 48 hours later. All reactions less than 5·0 millimetres in diameter were regarded as no reaction. Only the area of induration and not the areola was measured. A group of 137 rheumatic children were tested in this way, and 90 non-rheumatic children were tested with the same material; 79·4% of the rheumatic children reacted and 20·6% did not react. In the control group, 28·88% gave a positive reaction and 71·12% no reaction. The test cannot be considered diagnostic of rheumatic fever; but a positive skin test strongly suggests rheumatic fever. In the rheumatic fever group the frequency of positive reactions increased steadily with the age of the patients. The severity of the reaction was also greater in older children. There was no correlation between the intensity of the skin test and the severity of the cardio-vascular disease.

Vitamins A and D in Measles.

Helen M. M. Mackay, Hilda M. Linford, Maurice Mitman and Mary H. Wild (*Archives of Disease in Childhood*, June, 1936) investigated the effect of giving vitamin *D* and vitamin *D* plus vitamin *A* to children under thirteen years of age with measles at the North-Eastern Hospital, London. The 697 cases were divided into three groups. The first group served as controls and had the ordinary ward diet only. The second group received in addition 3,000 international units of vitamin *D* daily as an emulsion of calciferol. The third group received the same amount of vitamin *D* with, in addition, vitamin *A* equivalent to 24 cubic centimetres (six drachms) of cod liver oil of a blue value of 7·5. The children were fairly evenly divided between the three groups as regards age, incidence of pneumonia, and incidence of otor-

of otorrhœa. A comparison of the fatality rates, of the incidence of pneumonia, of otorrhœa, of all complications, and of skin lesions developed in hospital, as well as a comparison of the duration of pyrexia or length of stay in hospital, affords no evidence of any favourable effect achieved in the course of the disease by giving either vitamin *D* or vitamin *D plus* vitamin *A*. It is pointed out that this result may be due to: (i) the shortness of the time of observation (average under twenty days), and (ii) the lateness in starting the treatment, since in 81% of the cases treatment was not started until after the appearance of the rash, say till the fourth day or later in the disease.

ORTHOPÆDIC SURGERY.

The Treatment of Atrophic Arthritis.

W. P. Holbrook and D. F. Hill (*The Journal of the American Medical Association*, July 4, 1936) discuss the treatment of atrophic arthritis. They emphasize the absence of any specific cure and the necessity of using a comprehensive programme of management, including correction of diet, bowel management, rest, exercise, prevention of deformity, general physical therapy and climatic residence. They regard heredity, infection, climate, fatigue, trauma, exposure, nervous strain, circulatory disturbance, gastro-intestinal dysfunction and endocrine disorders as ætiological factors; therefore, treatment, if it is to be successful, must depend on a programme utilizing every available therapeutic aid. Local treatment should aim at maintenance of muscle tone, retention of joint movement, and prevention of deformities. The diet should be adjusted to the needs of the individual patient, a high calory and high vitamin diet being given if the patient is under weight, and low starch and low fat diet for the obese. Bread and pastry eaters rarely eat enough vitamin and mineral-containing food. Adequate intestinal elimination is secured without cathartics. Removal of foci of infection should be undertaken early if it is to be of benefit; but regard should be paid to the hazardous nature of this procedure, every attempt being made to raise the patient's resistance by rest, blood transfusion and increase of weight, first. The authors continue using autogenous vaccines in minute doses, intravenously or subcutaneously, but have an open mind regarding their value. Blood transfusion is of great value in building up the patient and arresting the disease. Drugs, such as salicylates, hydrochloric acid, arsenic and iron, are of value; but sulphur and gold are disappointing. Vitamins have been of value; but hopes for the value of fever therapy have not been realized. Physical therapy consists largely in postural correction, assistive exercises and corrective exercises; massage and heat are used only until active exercises are possible. Flexion deformities should be prevented by rest without pillows on a bed that does not sag. All painful joints should be splinted as far as possible in extension. Chest and abdominal exercises and full passive movements of each joint should be practised daily. Manipulations followed by retention in plaster should be performed if deformities resist the above measures.

Reconstruction of the Digital Tendon Sheath.

L. Mayer and N. Ransohoff (*The Journal of Bone and Joint Surgery*, July, 1936) describe a new method for providing a gliding mechanism in transplantation and repair of damaged finger tendons. In the treatment of traumata to the finger tendons one great difficulty arises from the adhesions that bind the distal stumps of the flexor tendons to one another and extend up to the proximal end but destroying the smooth cells on the surface of the tendon and its sheath. If there has been even a mild infection the degree of damage is proportionately increased. The authors have adapted the work of Prime, who discovered that chemically pure celloidin, if used to prevent adhesions following operations upon the brain, became coated with smooth tissue whose flattened cells resembled those lining the wall of the tendon sheath. They describe their method of preparing celloidin tubes of varying sizes corresponding to the tendon sheaths of different hands. These celloidin tubes are kept in a solution of distilled water until the time of the operation, when they are sterilized by immersion in a 1 in 2,000 solution of oxycyanate of mercury for no more than twenty minutes. The operation is done in two stages, the first of which consists in a complete resection of the scarred tendon sheath and damaged tendons, and the implantation of the celloidin tube of appropriate size, which must reach from the proximal stumps of the tendon to the distal attachment of the *flexor digitorum profundus* at the base of the distal phalanx, precautions being taken to see that the incision in the skin follows the normal creases of the palms and fingers. The proximal stumps of the tendons are fixed to the proximal ends of the celloidin tube by a stitch, and the distal stump of the *flexor digitorum profundus* tendon is similarly anchored to the distal end of the tube, which thus occupies the space left by the resection of the tendon and the scarred sheath. The subcutaneous tissues are united over the tube by a series of interrupted sutures, the skin being united by similar sutures, and a light splint is applied to fix the finger that has been operated upon. The second stage of the operation, which is performed from four to six weeks later, consists in a small incision down to each end of the tube, through which a probe, threaded with a silk guide suture, is passed; the tube is then withdrawn from the finger, leaving the guide suture in place. In every instance the tube has been found completely enveloped by a smooth, glistening membrane, whose surface closely resembles the normal lining of a tendon sheath. The remaining steps of the operation, including the implantation of a free tendon graft, are similar to those described in Bunnell's work, care being taken to insure that the tendon is sutured at its correct length. The details of the after-treatment are regarded by the authors as being no less important than those of the operation. The finger is splinted, and passive motion is begun on the seventh or eighth day, followed by active exercises combined with sinusoidal stimulation of the muscles on the ninth or tenth day. The physiotherapy must be continued for many weeks until function has been regained.

Treatment of Chronic Osteomyelitis.

B. Armstrong and T. F. Jarman (*The Journal of Bone and Joint Surgery*, April, 1936) describe the treatment of chronic osteomyelitis by the method of applying Thiersch grafts to cavities and recesses on a mould of Stent's dental composition which exactly fits the cavities to be grafted. They have applied this method to promote rapid epithelialization and healing of bone cavities left after radical operation for chronic osteomyelitis, and they are of the opinion that it prevents the persistence of multiple points of discharge on the surface of the granulation tissue left after the stage of saucerization of the diseased area which is a necessary preliminary in the treatment. After saucerization and suture of the margins of the skin incision to the periosteum and fascia along the border of the cavity, the dressings are changed every two days for six days and then the wound is dressed daily and washed out with sterile saline solution until the cavity is lined by healthy-looking granulation tissue. The dental composition is sterilized by immersion in an aqueous solution of mercury biniodide and is rendered malleable by immersion in hot water; the malleable mass is inserted into the cavity and made to apply itself to all parts of the cavity and allowed to set hard. This mould is now covered with Thiersch graft, the deep surfaces uppermost, and is reinserted into the cavity, gentle pressure being maintained on the mould by means of adhesive strapping. The mould is allowed to remain in position for ten days, at the end of which time the Thiersch grafts will be found to be living and attached to the granulation around the walls of the cavity. The cavity is lined with fairly thick skin in from four to ten weeks, and with the passage of time a certain amount of subcutaneous tissue is deposited beneath the epithelium.

Special Article.

SOME METHODS OF DIAGNOSIS OF EARLY CANCER.

Of the many attempts that have been made to find a specific test for the diagnosis of cancer in its early stages but few have survived the test of time. Clinicians, biologists, chemists and physicists have independently and conjointly proposed a host of methods, most of which have been shown by later experiments to yield insufficiently decisive results. There are some tests, however, for example those of Fuchs, Sehrt, Klein and Links, which have been applied to a great many cases with a considerable measure of success. These tests are based on certain known characteristic properties of the red cells (Sehrt), fibrin (Fuchs), or serum (Klein and Links) of the blood of cancer patients.

The Cancer Disposition.

The fundamental assumption which underlies these methods is that there is a cancer disposition of the blood in cancer patients and that no malignant tumour can form unless this disposition has manifested itself.[1] This assumption has been definitely established in the case of mice by numerous workers, and is inferred to hold also in the case of human beings. Whereas it was at one time believed that the tumour was the primary manifestation of cancer and that products of its metabolic processes subsequently produced aberrations in the blood, it is now believed by many workers that the tumour is preceded by the cancer disposition. It is clear that when once the tumour has begun to form, the composition of the blood will become further affected and secondary indications will betray themselves. It is important, therefore, to distinguish between these primary and secondary manifestations and to make use only of the former in any actual method of diagnosis of early cancer. Much confusion has been caused in the past by a failure to recognize this fact.

A difficulty also arises in that a definite test may indicate a cancer disposition, whereas no malignant tumour may yet be discoverable clinically. The most satisfactory test, then, is one in which no negative results are obtained when the malignant tumour is definitely known to be present. It does not follow that a malignant tumour will form in a patient in whom the cancer disposition has been detected, but there is a danger that it will do so eventually. It will be recollected that to explain the specificity and the transmissible specificity of the fowl tumour Gye[2] suggested that the virus could not by itself infect a cell, but that to do so it had to be associated with a second, chemical, factor; this second factor determined the type of tumour which would be produced by the virus. Lockhart-Mummery[3] concludes that the difference between a simple and a malignant tumour is due to some biochemical property peculiar to the malignant cell. To gain an insight into the primary chemical changes in the blood we must refer briefly to some of Warburg's important discoveries.[4][5]

Warburg's Results. Fischer-Wasels's Experiments.

In 1923, and later, Warburg made known the results of his researches into the metabolism of cancer cells. He showed that the chief process involved was that of glycolysis. His studies were concerned with the two most important sources of energy of the living cell, "respiration and fermentation" (oxidation and glycolysis). Very close relationships were found to hold between the structure and the respiration of cells with regard to the amount of oxygen consumed.

Warburg demonstrated that the consumption of oxygen in a cancer cell is decreased, whereas the glycolytic action is increased 70 or 80 times as compared with that of a normal cell. Moreover, in contrast with the normal cell, this greatly increased glycolysis is maintained by the tumour cell, even in the presence of oxygen; in the normal cell, which also manifests anaerobic glycolysis, this action is discontinued immediately when sufficient oxygen is available. The cancer cell thrives essentially at the expense of a "fermentative" process (in Warburg's sense). For example, a rat carcinoma may oxidize only one out of every thirteen molecules of sugar supplied and will then cause fermentation of the other twelve molecules, producing lactic acid from them. After Warburg's discovery (that there is a great decrease in the oxidation processes and an increase in both the aerobic and the non-aerobic glycolysis of the cancer cell) had been confirmed by numerous other workers,[6] Fischer-Wasels[7] and Büngeler[8] set themselves the task of finding out whether the oxidative and glycolytic conditions that characterize the cancer cell likewise obtain in the whole body of an animal which has a malignant tumour, the object being to gain information about the vexed question of "tumour disposition". Their researches disclosed that in the organs (for example, skin, liver, kidneys) of mice with spontaneous tumour growths there was a very marked decrease in the oxidative processes and an increase in the anaerobic and aerobic glycolysis. They also showed that similar and equally pronounced metabolic disturbances occurred in the organs of animals that had been subjected over a prolonged period (at least 120 days; this time is the equivalent of at least ten years in the life of a man[9]) to chronic tar or arsenical poisoning, that is, in the organs of animals in which a general cancer disposition had been artificially induced. Moreover, it is remarkable that an aerobic glycolysis occurs in organs which normally do not exhibit this form of glycolysis (namely, "fermentation" in spite of the presence of oxygen). In this way Fischer-Wasels and Büngeler succeeded in showing not only that the metabolism of the tumour cell itself is changed pathologically, but also that the general cancer disposition is associated with metabolic disturbances in the whole system that resemble closely those discovered by Warburg.

It was only after Yamagiwa and Ichikawa[10] had succeeded (in 1916) in showing that cancer could be induced in mice, by painting some definite area of their skin with tar for some months, that the attention of investigators was called to the general effects of the tar. Bierich and Möller,[11] Lipschütz,[12] Mertens[13] and others showed that the damaging effects of the tar to the whole system played an important part in the genesis of the tumour. Fischer-Wasels and Büngeler showed that by painting the tar on different areas of the skin of the mice instead of on only one area, a certain condition was induced in the animal such that if any part of it was seared with a burn, which would not of itself cause a tumour to grow, a lively process of regeneration would come about and in many cases papillomata and genuine infiltrating squamous-cell epitheliomata would arise. The results of these experiments were confirmed by other workers (Kreyberg,[14] Bloch,[15] Akimoto,[16] Beck,[17] Döderlein[18]), some of whom introduced modifications (intraperitoneal, intravenous or rectal absorption of tar, arsenical poisoning and so forth). Spontaneous growths often arose in parts that had not been painted at all (Krotkina,[19] Clara Lynch,[20] Schabad[21]). As emphasized by Braunstein,[1] there can be no doubt that a general constitutional tumour disposition can be induced by the effects of tar, arsenic and some other carcinogenic substances. This brief account may serve to justify the application of those methods of diagnosis which depend on the existence of the cancer disposition. This disposition may be inherited[22] or may be acquired. It is clear that precise knowledge of the composition of the blood of cancer patients must be of great value in determining the stage or the progress of the disease. A comprehensive and regularly repeated survey of the blood of many cancer and non-cancer patients is indicated. This principle has recently been adopted by J. Loiseleur at the *Laboratoire Institut de Radium*, Paris.

Before discussing the diagnostic tests it must be mentioned that radiation treatment of any kind, many drugs and also diet may cause temporary changes in the blood which may vitiate the results of these tests. The blood must therefore be taken from the patient fasting, and any

treatment to which the patient may have been subjected must be known and taken into consideration.

Sehrt's Indophenol Blue Test.

On the basis of Warburg's findings Sehrt[22] has proposed a method of diagnosing cancer by determining colorimetrically the amount of indophenol blue formed by the blood under certain conditions. We cannot here describe the details of the theory on which Sehrt has built up his method. The actual test,[23][24] which is supplemented by a second simpler test, given below, is as follows.

The blood is taken from the fasting patient, insulin (10 to 20 units) having been previously administered subcutaneously as a safeguard against the increased blood sugar content which often occurs in cancer patients (remarked on by Freund in 1885; compare also Woodward and Fry[25]), which has been found to affect the measurements. Dark venous blood is drawn off, part of it being taken up in a hæmoglobinometer tube and a part under ether (to remove fats) into a Hahn reagent tube, provided with a glass bead, until it is filled to almost one-fifth of its length. This tube is closed with glass stoppers (air bubbles being avoided) and is vigorously shaken for eight minutes. In the meantime the blood in the hæmoglobinometer, which has been diluted with N/10 hydrochloric acid solution in an Autenrieth-Königsberger colorimeter, is measured in Sahli percentages exactly forty-seven minutes after the blood has been drawn. Next, the sample of blood which has been kept under ether is shaken up and then run into several tubes containing ether, which are centrifuged for ten minutes. Other tubes are now made up to 5·0 cubic centimetres with equal quantities of fresh dimethylparaphenyldiamin base solution (0·1 gramme in 20 cubic centimetres of 0·9% sodium chloride solution, free of oxygen, at room temperature) and α-naphthol solution (0·6 gramme in 120 cubic centimetres of oxygen-free 0·9% sodium chloride solution); 10 cubic millimetres of the red cells and 50 cubic millimetres of 5% ammonia solution are run into this mixture, causing hæmolysis. The tubes are closed with glass stoppers, air bubbles again being avoided, and after thirty-seven minutes the colour of the solution is compared in monochromatic sodium light[26] with a calibrated blue wedge. Corresponding to a definite quantity of hæmoglobin, there is a definite amount of indophenol blue formed; this colour is found to be increased in the case of cancer patients. This increase occurs because the oxygen available to the red cell is less consumed in consequence of the decreased respiration of carcinoma cells; that is, there is a lower degree of effective oxygen absorption in the venous blood of cancer patients.

In 500 cases the test yielded 82% correct results, 10% wrong results, and 8% were indefinite. In a recent paper Sehrt[22] compares his results statistically with those obtained by other methods, and states that by first removing the fats from the blood and decreasing the blood sugar he has obtained 100% correct results in thirteen cancer patients and 12% positive results in non-cancer cases; the latter result agrees with that obtained by other methods and is, in Sehrt's opinion, not due to faults in the method, but is due to the fact that it also detects the cancer disposition. Thus relatives of cancer patients were also often found to yield positive results. Moreover, in eight of these positive cases a malignant tumour later developed.

Sehrt's Retarded Hæmatin Test.

A second, much simpler, test has also been devised by Sehrt.[27] It is founded on the same principles as his first test and is called by him the *Hæmatinverzugprobe* (retarded hæmatin test). It is essential that the patient under examination should not recently have been treated surgically nor have been irradiated. Blood is drawn off from the fasting patient, no food having been given in the preceding twelve hours; undue loss of fluid from the patient must be avoided (aperients must not be given); the rectal temperature must not exceed 37·8° C.; twenty units of insulin must be administered two hours before the withdrawal of the blood. Dark venous blood must be taken. Four special pipettes must be filled in rapid succession to the mark 20 cubic millimetres and then must be made up to two cubic centimetres with N/10 hydrochloric acid and immediately mixed by shaking with the glass bead of the pipette. After five minutes, as measured by a stop watch, the colour is read off in a colorimeter and a second reading taken after forty-seven minutes. In normal and non-cancer cases it is found that the Sahli percentage is initially, say, 70·4 and that after forty-seven minutes the suspension has darkened, say, to 76% or 78%. The blood of cancer patients, however, behaves very differently. The darkening is almost imperceptible and rises from, say, 70·4% to less than 73·5%, in exceptional cases to 74·0% (after two hours). The same result as for cancer is obtained in the case of pregnancy, and to distinguish between them it may be necessary to carry out an Aschheim-Zondek test as well. Sehrt first used an Autenrieth-Königsberger hæmoglobinometer in the retarded hæmatin test. He attained an accuracy of 93% in 637 cases, of which 160 were cancer cases. In his latest communication Sehrt[28] mentions that he now uses a specially designed photo-electric colorimeter, which has increased the accuracy of the method. This method claims to detect squamous-cell epitheliomata and laryngeal and œsophageal carcinomata, which often elude other tests. In a footnote to one of Sehrt's papers[27] the editor of the *Münchener medizinische Wochenschrift* recommends that Sehrt's simple test be tried in as many institutions as possible.

The Freund-Kaminer Reaction.

The earliest method of investigating blood which has some claim to be regarded as being specific for cancer is based on a reaction discovered in 1910 by Freund and Kaminer.[29] In contrast with many other tests, it involves the use of cells of malignant tumours. According to these authors, the blood serum of a normal patient causes a lysis of malignant cells when incubated with them under sterile conditions, whereas the serum of carcinomatous patients lacks this lytic power. This reaction, known on the Continent as the Freund-Kaminer reaction, was discovered almost simultaneously by C. Neuberg.[30]

According to H. J. Fuchs,[31] this reaction is not sufficiently specific for diagnostic purposes, for the following reasons: (*a*) Sera with an excess of tumour antibodies destroy cancer cells, sometimes more actively than normal sera, in which it is known that specific cancer cell antibodies are absent. (*b*) Some non-cancer sera are likewise unable to destroy cancer cells. (*c*) Sera of patients in whom antigens of embryonic cells have passed into the blood stream do not destroy cancer cells at all or have only a slight destructive effect on them. This may occur in the case of pregnant patients. (*d*) Hereditary causes may also yield sera that do not destroy cancer cells.

These objections make it clear that the Freund-Kaminer reaction in its original form lacks uniqueness. A further difficulty is encountered owing to the fact that the test material, the cancer cells, are not easily available in a standard form over a long period. These obstacles, which have since, however, been largely overcome (see Klein's test below), led Fuchs to devise a new method, based on an apparently more specific property of cancer serum, which will be described later. An attempt was made by Abderhalden[32] to overcome the instability of the test material by preparing dried standards of cancer cells; but the method of preparation caused changes in the cells which did not improve the specificity of the reaction. Other technical modifications by Abderhalden[33] (ninhydrin reaction for determining the amount of amino-acids) failed to yield more successful results.

A Modified Abderhalden Test.

Recent modifications of Abderhalden's method have been suggested by Mertz and von Lüttge;[35] and the last of these is a method of flocculation by means of phosphotungstic acid. It is described and discussed critically by S. Zuech.[34] The method is as follows. One cubic centimetre of venous blood is taken from the patient (fasting) and is treated with one cubic centimetre of a 2·8% aqueous solution of

phosphotungstic acid and allowed to stand at room temperature for half an hour. In the case of a cancer patient a flocculation occurs, which gives the liquid an appearance of milky turbidity. Mertz suggests the addition of several drops of bromphenol blue (after the experiment has been in progress for half an hour), in order to facilitate the interpretation of the reading obtained. The liquid assumes a greenish blue tint in the case of carcinomatous patients, whereas it is of a pure blue colour in the case of non-cancer patients. The test may be positive in the case of pregnancy, so that in some circumstances the Aschheim-Zondek test may be applied to discriminate between the two possibilities. The method is the more trustworthy the sooner the turbidity appears. The result is to be regarded as indefinite if after half an hour turbidity occurs but no flocculation. In all but four out of sixty test cases this method of diagnosis yielded results that agreed with the clinical diagnosis. To trace the route by which the original biological reaction of Freund and Kaminer has in this way become transformed into a chemical reaction, the reader is referred to Mertz's[24] original papers. This test may be improved by using a photo-electric nephelometer similar to the colorimeter used in our new method of determining the phosphorus partition in the blood, which will be referred to below.

Klein's Diagnostic Test.

During the last few years the Freund-Kaminer reaction has been taken up again by G. Klein,[25] who assumes that a carcinogenic substance comes into action wherever the defences of the organism have become weakened. His researches constituted the main theme at the Scientific Congress at Frankfurt-am-Main in September, 1934. It was maintained by various medical research workers at this congress (Teutschländer,[36] Caspari,[37] Fischer[38]) that the defences of the organism against cancer are unspecific, being bound to the system of organs which Aschoff first recognized as being biologically connected but scattered throughout the organism, namely, the reticulo-endothelial system. In this connexion we may quote from Hadfield and Garrod: "There is, however, a good deal of evidence that neoplasia, whether experimental or spontaneous, is resisted by an active cellular defence mechanism, and in as far as this is so, the cells taking part are those of the reticulo-endothelial system." Klein claims to have proved that three factors are necessary to transform a normal cell into the first carcinoma or sarcoma cell, namely, "loss of defensive power, a specific agent and a local injury or a specific disposition of the tissue in question". In his view, absence of the natural defence against a cancer growth constitutes a cancer disposition. No information has yet been given by him concerning the specific agent, but an announcement on this subject has been promised for a later date. Klein found that whereas he could not confirm the findings of some workers, according to which the serum of cancer patients could dissolve normal cells, he found that normal serum possessed a lytic power with respect to cancer tissue, as stated by Freund and Kaminer. His method consisted in taking suspensions of cells derived from animal carcinomata of the same type and of the same age, and which had undergone the same treatment, and measuring the lytic effect of the serum to be tested on this cell suspension. The cells were counted photomicrographically at the beginning and again after a certain lapse of time. A description of the method of preparing cell suspensions and also an example of an actual photomicrograph are to be found in a paper by Lustig and Wachtel,[39] in which many useful details of Freund and Kaminer's researches are set out. Allowance having been made for autolysis (a factor which had been neglected by previous workers), Klein was able to determine whether a lysis occurred or not, or whether there had been an increase in the number of suspended cells, as occurs in some sera of carcinomatous or sarcomatous patients. Deviations which presented themselves in cases of simple ulcers, lues, tuberculosis and pregnancy required special consideration. The method also distinguishes clearly between sarcoma and carcinoma. In this connexion it is interesting to note that Freund and Kaminer found that in experiments carried out *in vitro* the cells of epitheliomata utilized from a nutritive solution relatively large quantities of glucose, lecithin and nuclein, whereas sarcomatous cells utilized peptones and nucleins. This discrimination, which is not exercised by normal cells, expresses itself in the different glycide and peptone content of epitheliomata and sarcomata. According to Lustig's experiments on lung tumours, the differences in the partition of nitrogen and the glycides, found by Freund in different kinds of tumour, relates chiefly to the rest nitrogen (compare Fuchs's method below). Klein found that his measurements were affected by narcotics, insulin (for forty-eight hours after it had been administered), digestive ferments after meals, retention of food, hæmorrhages and, in particular, X ray and radium treatment.[40] Observations of Heineke,[41] Murphy,[42][43] and others, concerning the effect of radiation on the reticulo-endothelial system, which, as Klein showed, manifests itself in a restoration of the lytic power of the serum, were confirmed. It was found that by administering doses according to a definite scale at appropriate intervals the lytic power of the serum could be brought to its normal value. Klein's method had been tested, up to the time of the congress, in the case of 10,000 animals and 12,000 human patients. A correct diagnosis was claimed in over 90% of those cases. Reports from various hospitals gave figures between 93% and 98%. It is hoped to test 100,000 cases per year in this way at the biochemical laboratory of the great I.G. Dye Trust at Oppau. Klein[25] mentions that certain bacteria are able to produce, under certain conditions of culture, a lytic substance for cancer cells, and that he has succeeded, in collaboration with Stade, in isolating the lytic substance from the serum and the organs.

Cytolytic Power of Certain Organic Substances.

Freund[44] considers that the lytic substances are dicarboxylic acids, of the type of fumaric acid, with an odd number of C_2H_2 groups. According to him, the carcinolytic substance can be obtained in a thousandfold concentrated form from the urine[45] of young people, and it is easy to follow the destruction of the cancer cells by this substance under the microscope. A study of the cytolytic power of over 100 organic substances has been carried out by Lustig and Wachtel.[39] Reference must also be made, in passing, to the valuable work done by Raab[46] on the nature of the lysis of cancer cells. He prefers to regard the Freund-Kaminer reaction as being due to an anti-autolytic action of cancer serum, which he regards as characteristic but not specific. His researches deal with the power of dissolving cancer tissue possessed by trypsin, and with the action of other substances which inhibit this lytic power (these have also been investigated by Lustig and Wachtel). The idea that the defensive systemic factors of the body are normally at work against the development of the growth of cancer has long been maintained by Shaw Mackenzie,[47] who found that the lipolytic ferment action of the serum was particularly decreased in individuals with progressive cancer as compared with the serum of normal persons, and that this deficiency was associated with an increased cholesteræmia. Similarly, Köhler,[48] following Bernhard, recently showed that there was a marked change in the amount of atoxyl-resisting lipases contained in the blood of cancer patients; this change may be measured by means of a stalagmometric method and may serve as an index of early cancer.

The Efficiency of the Reticulo-Endothelial System.

If a cancer disposition arises owing to the functions of the reticulo-endothelial system being impaired, it naturally suggests itself to test the efficiency of this system. Barbera[49] has shown that if Congo red is injected intravenously into healthy individuals, 50% to 70% is traceable again in the blood. He also investigated this retention in ten patients with malignant tumours but no cachexia. The amount of Congo red traced in the blood was found to lie between 92% and 100%. He interpreted this as indicating that the functions of the reticulo-endothelial system were being inefficiently performed. An accurate method of

determining the efficiency of this system is given by Stern and Willheim;[50] this investigation deserves to be considered as an aid to diagnosis and as an index of the effect of any treatment to which a cancer patient may be subjected.

Unsaturated Fatty Acids in the Serum.

Freund and Kaminer asserted long ago that in the blood serum of patients with malignant tumours there is in general an increase in the content of unsaturated and unstable fatty acids. Von Noël[51] has shown that in the serum of cancer patients there is a specific change in the relationships between the fatty acids of high and low molecular weight and the cholesterol content. Ascoli[52] and his collaborators have tested Freund and Kaminer's statement in 65 cases by a new method. They found increased values of the unsaturated and unstable fatty acids in malignant neoplasms, liver and kidney diseases and diabetes. To shed light on the nature of the substances that caused an increase of the acidity in the ether extracts of the serum these workers determined the quantity of double-bond acids in 144 cases by finding the iodine number of the extracts. In these cases the subjects included 25 normal patients, 8 pregnant women, 40 persons with malignant tumours, 8 with benign tumours, 7 with tuberculosis, 16 with hepatic disease, 11 with diabetes, 5 with nephritic disease, and 24 with diverse conditions. The results obtained indicated that the iodine number is increased in only a few diseases (malignant disease, some hepatic and some nephritic diseases), whereas in other diseases and in normal cases the iodine number generally has lower values. In diabetes and certain hepatic diseases the increased degree of acidity exhibits no parallelism with the iodine number. Hence it is inferred that in carcinomatous patients there is a disturbance of the fatty metabolism, which expresses itself chiefly in the formation of unsaturated fatty acids and unstable fatty acids. The increase of acidity in the case of other diseases is therefore ascribed to other acids in the blood.

Indovina and Fiandaca[53] carried the investigation a stage further by determining the ratio of the total unsaturated compounds extracted by treatment with boiling alcohol and ether to the total unsaturated compounds extracted by ether alone. In patients affected with kidney and liver diseases, and also in healthy individuals, this quotient was about 6, whereas for cancer patients it sank to 2. They also investigated whether these changes in fatty metabolism occurred only in the blood serum or whether they also occurred in the red cells. Their researches disclosed that the same disturbance could be detected qualitatively in the red cells. Vercesi and Guercio[54] have determined the iodine number of the ether extract of dried serum of patients in various stages of pregnancy, in patients with uterine cancers, and in patients with various other gynæcological diseases. The iodine number was found to be increased only in patients with malignant tumours. Franke[55] has discovered that vitamin *A* and, to a less degree, also the carotinoids have the property of acting as catalytic agents in the auto-oxidation of unsaturated fatty acids. It is also known that vitamin *A* in small doses exerts a stimulating action on the reticulo-endothelial system. Lustig and Wachtel have shown that injections of vitamin *A* can strongly inhibit tumour growth.

Ascoli[52] has developed a plan for the systematic investigation of blood for purposes of cancer diagnosis and has defined the conditions which, in his opinion, any such plan must fulfil. There seems little doubt that the determination of the above-mentioned ratio of the unsaturated fatty acids is of value as an index of cancer; moreover, it is easily determined.

Tumour-Specific Antibodies.

The next series of tests to be mentioned arose from the discovery of the presence of specific antibodies in the blood of immunized animals and cancer patients. Proof of their existence was given by Lumsden,[56][57] Hirzfeld,[58] Witebski[59] and Fuchs.[60] Lumsden performed numerous experiments which appear to establish definitely that there are specific antibodies which are directed against tumour cells; they are believed to be contained in the euglobulin fraction of the immune serum and, it is claimed, have been purified and concentrated from these sera.

Fuchs[61] has shown that in the process of coagulation of the blood tumour-specific substances are to be found in the fibrin of cancer patients. Making use of an original micro-method of determining nitrogen, he has produced evidence which goes to prove that all malignant tumours, no matter what their origin may be nor in what organ they may happen to occur, produce a specific substance which is common to all of them, namely, a tumour-specific antigen. This substance has the power of forming in the organism a specific substance called the tumour-specific antibody. Both these substances, the antibody and the antigen, are contained in the blood of cancer patients and are adsorbed by the fibrin during spontaneous clotting; the major portion, however, remains behind and can be precipitated, together with the serum proteins, by means of tri-chloracetic acid.[62]

The Fuchs Test.

Fuchs[31] had discovered, by chance, that the fibrin of healthy individuals is broken down by the serum of cancer patients (proteolytic decomposition by means of proteases in the serum), but not the fibrin of cancer patients themselves. This reaction causes a definite increase in the rest nitrogen of the fibrin-serum mixture compared with the rest nitrogen of the cancer serum alone. Later, after the discovery of the antigens and antibodies, Fuchs and Devrient[63] dispensed with the fibrin and investigated the serum alone after precipitation with eleven times its volume of 2·5% tri-chloracetic acid. In a very recent publication by Fuchs[31] full details are given of the very delicate test involved, which must be carried out with specially designed apparatus. Fuchs's long and thorough paper deserves the most careful attention, as it contains much useful information for the practical application of his ideas. Sehrt[32] states in his statistical table that over 5,000 patients have been examined by Fuchs's method and that 92% to 94% correct results have been obtained.

Use of Bacterium Coli.

Various modifications of Fuchs's method have been suggested. To simplify it and to prove that there is a proteolysis of the fibrin substrate Čížek[64] makes use of the property of *Bacterium coli* of forming indol from the decomposition products of albumin, which contains the tryptophane group. Wollmann had suggested this method in 1924. The indol can then be easily detected by the Ehrlich test. Čížek examined 150 cases and obtained the following results with carcinomatous blood: 90% correct, 6·7% incorrect, 3·3% indefinite. The control cases gave 93·7% correct, 2·5% wrong, 3·8% indefinite results. It may be mentioned that Fuchs found that the property, possessed by pathological serum, of attacking normal fibrin, but not fibrin of the same pathological disease, was true not only in cancer, but also in tuberculosis, lues and scarlatina.

Minibeck's Modification of the Fuchs Test.

Minibeck[65] has pointed out that the great technical difficulty of Fuchs's method arises from the circumstance that the accuracy required is sometimes of the order of 0·5%, and he therefore suggests the simpler method of determining the amino-acid fraction of the incubated mixture of the test serum with substrates of known properties. He uses the titrimetric method of Linderstrom and Lang, as modified by Zirm and Benedict. He obtained 17 correct positive results, 23 correct negative results, and 6 indefinite results; no actually wrong result was obtained in the 46 cases he examined. Mertzbach[66] has also measured the amino-acid nitrogen in the blood of 29 patients, of whom 12 had malignant tumours. He found that in the latter the values lay between 7·81% and 9·79% (of the total nitrogen), whereas in non-carcinomatous patients the values obtained were between 5·77% and 6·77%.

Brandt[67] has given a report of 112 cases that were chosen by him and tested by Fuchs, who was kept in

ignorance of the clinical diagnosis until his results were handed in; 92·5% correct results were obtained. Kafka[69] obtained 91% correct results in 108 cases and, later,[69] 92·6% correct results in 257 cases. He showed also that the method distinguished clearly between carcinoma, tuberculosis and lues. Jedlicka and Weichherz[70] obtained 93% correct results in 125 mixed cases. Although the Fuchs test is undoubtedly of great value, its usefulness is much restricted by the difficult technique involved; if Minibeck's or Čížek's modification continues to yield equally good results when applied to many more cases, one or other of them may yet become a standard clinical method.

Links's Serological Test.

Lastly, a few words must be said of some more purely chemical, if less specific, methods. Links[71] has shown that if serum is allowed to separate out from fresh whole blood, then the fraction which is drawn off after, say, forty minutes contains relatively different amounts of potassium and magnesium from those contained in fractions drawn off from the same sample of blood at later times (say after 80 minutes and 120 minutes). Moreover, these relative amounts are markedly different in cancer from those obtained in all other diseases. Links uses a formula which takes into consideration the red cell count and the age of the patient. The factors in which the potassium and magnesium figures are inserted appear to express, in a certain sense, the permeability of the red cells with regard to the respective ions. The potassium and the magnesium are determined from ashed residues, the potassium by titration, the magnesium by a colorimetric micromethod. In 211 cases, of which 42 were carcinomatous, 42 were cases of various diseases (ulcers, hernias, appendicitis and so forth), 25 cases of internal diseases (non-tuberculous), 31 tuberculous cases, 29 skin diseases and syphilis, 8 urological diseases, 7 laryngological diseases and smaller groups of other diseases, Links obtained results which agreed with the clinical diagnosis in 97·8% of the cancer cases and 97·3% of the control cases, whereas 9 cases gave an indefinite result. The method has also been applied in 100 cases by Weber and Schüle.[72] All the cancer cases were diagnosed correctly and only an 8% error was found in the non-cancer cases (according to clinical diagnosis); as mentioned earlier, the latter cases may be such as are already affected with changes which denote a cancer disposition. Links's test in the form given by its author is difficult to carry out. We have reason to believe that it is capable of considerable simplification if a photo-electric colorimeter is used.

Dannmeyer.

Another method which requires great technical skill has been devised by Dannmeyer[73] and his colleagues (Schnohr, Treplin). This *Restspannungsmethode* (residual potential method), which has been applied to over 700 cases, is founded on certain electrical properties of extracts made from the serum of the test patients. In Dannmeyer's opinion, based on his own experimental observations, cancer arises from a disturbance in the phosphatide metabolism in the system. He claims an order of accuracy of 90%. Tests carried out in the London Hospital, however, failed to reach this figure.[74]

Phosphorus Partition in the Blood.

Following on some earlier work by Kay and Byrom[75] and also by Youngburg and Youngburg,[76] we have recently investigated the partition of phosphorus in the red cells, serum, plasma and whole blood by a new and highly sensitive method which makes it possible to detect 10^{-9} gramme of phosphorus per cubic centimetre and to measure 10^{-8} gramme accurately. We have deduced from the Youngburgs' figures a result which appears to have escaped the attention of these authors, namely, that in normal blood the ratio of the total phosphorus content in the red cell to that in the plasma is about 5·0, whereas in cancer cases it averages 7·5, and may, as our own investigations show, rise to 11·0.[77] A similar relationship applies to the separate fractions (lipoid and acid-soluble) of phosphorus inside and outside the red cells in the blood. The number (50) of mixed cases we have so far investigated does not yet allow us to draw conclusions about the significance of this ratio, but it appears to indicate that the permeability of the cells is affected in some way. We have also found that after X ray or radium treatment and after operations this ratio may change markedly and may fall to the normal value (5). Nor can it yet be asserted with certainty that this ratio, if it exceeds the value 5, is indicative of a cancer disposition. Attempts are now being made to find also the relative values of lecithin and cholesterol in the red cell membranes with a view to obtaining some direct information about the permeability of this membrane.

Applications of the Tests.

Lack of space prevents the inclusion here of certain other serological tests which have been applied with rather less success than most of those here considered—for example, the Bendien test, in the modification of Cronin Lowe. In the latest communication[78] about this particular test the degree of correctness is given as 75%. The critical remarks concerning this test by Woodhouse and Jones probably apply with equal force to the flocculation test of von Lüttge and Mertz, which we have mentioned above.

In surveying the list of suggested methods of diagnosis of early cancer outlined in this paper we cannot help feeling that the time has arrived when several of the simpler tests might well be adopted in teaching hospitals and research institutes, where careful results might be kept for future reference. Moreover, these tests will be indispensable for following the progress of a patient under any form of treatment whatsoever. The methods that come into consideration for practical purposes are: (i) Sehrt's hæmatin colorimetric test; (ii) Ascoli's ratio estimation; (iii) Fuchs's method, as modified by Minibeck or Čížek; (iv) Links's test in a modified form; (v) Klein's test; (vi) Mertz and von Lüttge's modified Abderhalden test; (vii) estimation of atoxyl-resisting lipases; (viii) investigation of the reticulo-endothelial system; (ix) estimation of the relative amounts of phosphorus in the red cells and in the plasma.

When these tests have been applied to the blood of many hundreds of patients we shall be in a position to decide which tests are most useful clinically and which may be abandoned. It is important that one and the same test should be applied at intervals to the same patient before, during and after treatment. Special records must be kept in the case of patients whose blood gives a positive cancer reaction when there is as yet no clinical evidence of the presence of a malignant growth. Later reports have often disclosed that these patients subsequently developed such growths and so justified the view that the positive reaction was due to a cancer disposition.

The blood picture must also be recorded, as a knowledge of the relative numbers of the various formed elements in the blood is often of use in tracing the gradual disappearance of abnormalities.

It has been impossible to do more than deal cursorily with a few selected tests for early diagnosis of cancer in this paper, but we believe that those we have considered deserve special attention in view of the favourable results so far obtained with them, and on account of the comparative ease with which they may be carried out.

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Addendum.

In a private communication received by Dr. Mary Burfitt Williams from Professor E. Freund, Director of the Chemical Laboratory of the Pearson Endowment at Vienna, reference is made to a simple method of diagnosis, which he uses to confirm the cytolytic test for cancer. A solution of the fatty acids that protect carcinoma cells against lysis is prepared from the cultures of certain pathological *Bacteria coli*. This solution is injected subcutaneously. If a sharply defined, hard infiltration about five millimetres in diameter is formed, it is regarded as indicating the presence of a carcinoma. Professor Freund's communication is being considered for publication elsewhere. Sehrt[122] mentions that in 588 tests made with cutaneous reactions of various kinds 92·3% gave a result in accordance with the clinical findings.

British Medical Association News.

SCIENTIFIC.

A meeting of the New South Wales Branch of the British Medical Association was held at the Royal North Shore Hospital of Sydney on June 18, 1936. The meeting took the form of a series of clinical demonstrations by members of the honorary staff. Parts of this report appeared in the issues of September 19, September 26 and October 3, 1936.

Orthopædic Conditions.

Dr. S. H. Scougall, Dr. A. R. Hamilton and Dr. A. L. Ducker, from the Orthopædic Department, showed a series of patients who were suffering from orthopædic conditions.

Bilateral Disk Menisci.

A female patient, aged nineteen years, had complained for four years of a "clicking" right knee. For the previous twelve months she had had intermittent swelling and pain in the right knee with occasional temporary locking.

On examination a definite click was audible over both cartilages, more marked over the external; there were a peculiar bumping sensation and sound over the anterior end of the lateral cartilage on extending the knee to an angle of about 170°. The anterior end of the lateral cartilage then became palpable. Similar but less evident clicking was present in the left knee. The history was characteristic of a disk-shaped external semilunar cartilage.

It was explained that up to 1934 only 25 cases of this condition had been recorded. Of these, 13 were discovered in the dissecting room. Only nine operations upon the disk-shaped semilunar cartilage had previously been reported. Developmentally the condition was due to the persistence of the layer of mesoderm in the interior of the periphery, and liquefaction in the centre produced the normal characteristic shape of the semilunar cartilages. Treatment should consist of surgical removal.

Kienbock's Disease.

A female, aged fifteen years, was seen on February 28, 1936. She reported a direct trauma to the dorsum of her right wrist four months previously. She had struck the wrist joint against an upright iron railing as she swung her hand at her side; it was not a severe injury. She complained of an aching pain in the right wrist, with tenderness over the carpus, chiefly towards the ulnar side, both on the volar and dorsal surfaces. There was some limitation of both flexion and extension. An X ray examination revealed Kienbock's disease of the *os lunatum*, and a close-fitting plaster was applied for three months. There was at the time of demonstration no pain, and the only limitation of movement was the volar flexion.

The nature of the original injury was of interest in view of the common mode of production by hyperextension of the wrist. In this case there was actually some flexion at the time of injury. The lower end of the ulna was shorter than the radius, as mentioned by Brailsford. It would seem probable that the lesion did not follow forward dislocation of the semilunar. Recognition of minute fractures at the time of the original injury was of importance. Phemister had stressed the non-traumatic forms of the disease, classing it as akin to Perthes's disease of the hip. The lesion had been known to occur bilaterally in two brothers, and its association with the use of electricity had also been recorded. There were a number of cases recorded with no history of injury. Excision of the diseased bone had been practised, but in the main had not materially reduced the disability, which was often serious in degree.

Madelung's Deformity.

A female patient, aged fourteen years, had given a history that eighteen months before she sought advice her left wrist commenced to be painful and stiff. She gradually lost use of it. In February, 1936, she was not able to use it at all. Operation was performed in the same month. She had had moderate use after operation, since which she had been wearing a volar plaster mould.

It was explained that this was a spontaneous subluxation of the wrist which developed usually about the age of puberty. The condition was not a true congenital abnormality, but was probably due to some primary abnormality of the germ plasma, or some nutritional disorder, in some cases aggravated by occupation strain. The lower extremity of the radius became bent or curved forward and the head of the ulna remained backward. Pressure on the ulna reduced it to the level of the radius; but, owing to laxity of the lower radio-ulnar ligaments, relapse occurred immediately on release of the pressure. The condition was usually bilateral. The wrist was weakened and the disability was progressive.

Treatment consisted of osteotomy of the lower extremity of the radius; the articular surface of the radius was rotated backward to the normal position and the correction was maintained by plaster cast. In later life this procedure might need to be supplemented by resection of the lower end of the ulna.

Osteogenic Sarcoma.

A boy, aged twelve years, had complained of slight pain in the forearm for two or three days nine weeks previously. Swelling had commenced six weeks previously. The swelling disappeared in one week, staying away for one week and reappearing and remaining stationary. The boy's father thought that there was possible diminution one week later. The pain was so slight that he had hardly noticed it. He had lost power of the finger one week before and recovered this in a week. He had had deep X ray therapy.

It was explained that osteogenic sarcoma was a comparatively rare tumour, occurring most often in the male during the second decade. The majority of the tumours involved the long bones, especially the lower end of the femur (52%). A history of trauma was very often obtained. Pain was an early symptom, frequently occurring before the swelling became palpable. Spontaneous fracture might occur. In the early stages the patient's health was generally unimpaired, but later the patient went down hill rapidly, when metastases were deposited, principally in the lungs. X ray examination revealed a spindle-shaped swelling with an indefinite outline, erosion of the cortex, and radiating lines of ossification at right angles

to the shaft of the bone, in the late stages extending into the soft tissues of the limb. Treatment was of little avail. Deep X ray therapy might prolong life for about three years.

Method of Draining the Neck of the Femur.

A boy, aged ten years, was shown to demonstrate the result of a method of opening an infection in the neck of the femur. The patient, when seen on April 29, 1936, complained of pain in the left groin of five days' duration with inability to put the left heel to the ground. His mother stated that he had not had a bowel action for five days previously.

On admission to hospital his temperature was 39·1° C. (102·4° F.), his pulse rate was 104, and his respiratory rate was 24 in the minute. His urine was clear.

On examination there was fullness anterior to the hip joint on the left side; this fullness was also the point of maximum tenderness. Extremes of all movements at the joint were limited by spasm and were accompanied by complaint of pain, but some range remained in most movements free of pain and spasm. An enema was given with a good result that night. A tentative diagnosis made next day was of a low grade osteomyelitis of the upper end of the left femur.

On May 4, 1936, the leucocytes numbered 11,000 per cubic millimetre. Schilling's index was negative. The Mantoux test gave no reaction. The patient's maximum temperature was 38·9° C. (102° F.).

On May 8, 1936, the X ray findings were indefinite; some very early osteomyelitis of the neck of the femur was present.

On May 13, 1936, the leucocytes numbered 14,500 per cubic millimetre. Band forms numbered 8·5%, but no young forms were present. The maximum temperature was 39·4° C. (103° F.).

On May 15, 1936, it was decided to drain a suspicious area in the neck of the femur through a small lateral incision, using a Kirschner wire and portable X ray plant to locate the affected bone. A six-millimetre drill was then used adjacent and parallel to the wire to the same depth, and the wound was packed with vaseline gauze. An immediate swabbing yielded no organisms on culture, but the following dressing yielded a hæmolytic staphylococcus on culture on blood agar which, in the opinion of the pathologist, was not a contamination. By this time there was definite radiological evidence of osteomyelitis. The patient had been treated throughout with a plaster spica, and at no time had complained of pain. His maximum daily temperature during this six weeks had been from 38·9° to 39·4° C. (102° to 103° F.) and during the last week was approaching normal. A clinical examination of the hip joint showed a full and painless range of movement.

Fractures of the Neck of the Femur Treated by Smith-Petersen Osteosynthesis.

A number of cases of fracture of the neck of the femur were shown illustrating some difficulties in the use of the Smith-Petersen nail.

A female, aged seventy-one years, whose skiagram showed an intertrochanteric fracture of the femur on April 8, 1936, underwent an operation on the day following her injury (April 9, 1936). Although the usual method of reduction enabled a satisfactory position to be obtained at the fracture site, alignment was frequently lost while the wire was being drilled, even though a number of variations were made in the degree of abduction and rotation. This difficulty was caused by some comminution in the region of the trochanteric fracture, which was not readily visible in the original skiagram. The position was finally held for the wire with the leg externally rotated, and good position was secured.

Another female, aged forty-eight years, sustained a transcervical fracture of her right femur, through a fall from a sulky on April 5, 1936. Operation was performed on April 6, 1936, and the nail was inserted in a satisfactory position. Withdrawal of the wire in this case was not possible. The skiagram showed an extremely acute-angled recurvature of the inch of wire protruding beyond the nail. The wire had been previously cut short as the nail was hammered home, and the wire extractor could not engage the protruding inch and a quarter of wire. The nail extractor also failed to engage the thread of the nail. It was decided to leave the wire *in situ*, cut short beyond the head of the nail; no difficulty was anticipated from the wire.

A third female, aged seventy-eight years, sustained a transcervical fracture of the femur on March 29, 1936, and operation was performed two days later. At the end of five and a half weeks she was walking comfortably on a Trumble splint and was allowed to go home. The fracture was in good position, the nail satisfactorily introduced, but the tip of the nail did not quite reach the cortex of the bone in the head. At eight weeks she fell heavily while getting out of bed without her splint, twisting her affected hip. There was extensive bruising in the region of the old fracture, where her hip had come in contact with the floor. She suffered a good deal of pain, but kept walking in her splint. She consulted her local doctor, but did not report to the hospital till June 12, 1936. On this date an X ray examination showed the fracture still in position, but the nail was loose and had slipped down and out about an inch, with the tip of the nail still just inserted within the proximal fragment. In the meantime the patient had inadvertently left hospital and could not be located for forty-eight hours, during which time she walked in her splint. When located at this time, a further X ray examination showed that the nail had slipped a further half inch outwards and the fracture had displaced upwards. Reoperation had since been done in this case and a four-inch nail, which just projected through the cortical bone of the head of the proximal fragment, was used.

Congenital Dislocation of the Hip.

A girl, aged two and a half years, was admitted to hospital on August 3, 1935, because she had been unable to walk at the expected date. On examination it was found that she had a bilateral congenital dislocation of both hips.

Apparently no similar abnormalities were to be found in other relatives. The child had been a healthy baby, born after a normal pregnancy and confinement.

On August 5, 1935, an attempt was made at reduction by manipulation of both hips. X ray examination still showed upward displacement. The patient was now in a double spica in the "frog" position. Four further attempts at reduction were carried out at periods of one week, two weeks, three months and six months, at the end of which it was found, on February 13, 1936, by X ray examination that the right head was still high.

An open reduction was considered necessary when it was found that this head was prevented from returning to the acetabulum by an hour-glass constriction of the joint capsule. There was only a vestige of the *ligamentum teres* remaining.

On April 13, 1936, the left head was found high in position. Open reduction carried out one week later revealed a similar hour-glass constriction of the capsule of the joint. A readjustment was made to the left head, which was shown to be too high by X ray examination on May 25, 1936.

It was explained that the child would remain in plaster for nine months from the date of open operation for each side individually.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Millard, Philip Thornton, M.B., 1933 (Univ. Sydney), Womens' Hospital, Crown Street, Sydney.

NOTICE.

We have been asked to announce that the annual clinical meeting of the Section of Medicine of the New South Wales Branch of the British Medical Association will be held at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, on Thursday, October 15, commencing at 8.15 p.m. We are informed by the Acting Honorary Secretary of the Section that the patients to be shown will be not solely of medical interest, but will have features of surgical, radiological, ophthalmological and psychiatric interest as well.

Medical Societies.

THE MELBOURNE PÆDIATRIC SOCIETY.

A meeting of the Melbourne Pædiatric Society was held at the Children's Hospital, Melbourne, on June 10, 1936.

Pink Disease.

Dr. H. Boyd Graham showed a little girl, two years and eight months of age, who was recovering from pink disease. Dr. Graham said that he had first seen the child on May 8, 1936, two weeks after the onset of the illness. The child had had chicken-pox at the end of March, 1936, and at that time weighed just over 13·5 kilograms (thirty pounds) clothed. At the onset the child had wanted to lie about, had lost appetite, had become rather soft, and her joints had creaked; she developed a little rasping cough and her hair had lacked lustre; she became very emotional, crying and whining frequently; she closed her eyes and screwed them up, and avoided strong light. On interrogation the mother said that the child frequently assumed an attitude in bed with her head between her knees, and that she lived in a small country village where there was no possibility of contact with any child or baby with similar symptoms; the mother had heard of only one baby with pink disease, but had not seen the baby. The child had weighed 4·0 kilograms (nine pounds) at birth and was the first and only baby. The first illness had been chicken-pox, which was slight and from which she recovered satisfactorily, with the exception that her appetite became capricious; she liked meat, but did not get much; up till six months earlier she had taken cod liver oil emulsion regularly. On examination the child was very timid and fretful when she was carried into the surgery and during the examination, which she resented. She was unable to walk freely, and though she was able to stand, she was very insecure on her feet. She could sit up, but sagged forward. The shoulders were atonic, but did not slip through the fingers to any great extent. Redness of hands and feet with surface coldness was noted, and the mother stated that the hands and especially the feet had been swollen. The shoes that used to fit her tightly soon after the onset were then much looser. No rash was present at that time, but there had been a tendency to sweating. Extreme photophobia was a feature, with itchiness of the eyes, and the child said that her head got hot and itchy. Her weight was 12·4 kilograms (twenty-seven pounds fourteen ounces) unclothed, and her temperature was normal. Her pulse was rather rapid, but she was irritable. The mother was advised to keep the child cool and quiet; to sponge the skin at least twice a day with methylated spirits and to place smooth silk next to the skin. *Haustus Rhei et Sodii* was prescribed with ammonium bromide, 0·18 gramme (three grains), three times a day, and 0·18 mil (twenty minims) daily of standardized cod liver oil with "Viosterol". Normal diet with full vitamins was advised.

On May 21, 1936, the mother said that the child was improving, and after two or three hours' sleep in the afternoon, wakened happily and found her mother without crying. She was firmer on her feet and not nearly so irritable; photophobia was still a feature, and she was still flabby, though the knee jerks were elicited readily. A definite though slight mildly papular skin rash was present, and the mother stated that she had had occasional attacks of nausea and had complained of slight transient abdominal pain. Her weight was 12·72 kilograms (twenty-eight pounds four and a quarter ounces) unclothed. From May 14 there had been included in her daily diet raw egg yolk and albumen, raw potato juice and raw liver juice, and she had been taking one drachm of "Elixir Phenobarbital" night and morning.

On May 28, 1936, a patch of erythema urticaria was present at the nape of the neck, and the child said that something was biting her; the mother said that similar patches had appeared elsewhere on several occasions; both the ears had been very red and she had been pulling at them at times. She was much happier and not so flabby, and rarely assumed the knife-blade position in bed. She was still photophobic, but did not cry when she was addressed. She weighed 13·18 kilograms (twenty-nine pounds five and a half ounces) unclothed. Though her hair was still fairly brittle and dry, it was improving.

On June 4, 1936, she had walked into the surgery independently of her mother and was more lively and less emotional. Her mother said that she played with blocks and toys and was able and anxious to play by herself. On June 1 she passed a spongy green stool followed by white clear jelly with spots of blood, and was disinclined for food, but did not vomit; on June 2 three thread worms were seen in the stool, at least 2·5 centimetres (one inch) in length. She had recovered from this bowel upset by June 4. Her legs were getting stronger and she did not fall over as she had done previously when she wanted to run. Her hands and feet were not so cold. Her weight was 13·2 kilograms (twenty-eight pounds seven ounces) unclothed. A patch of erythema was on the chest and she was sweating a little about the head. On June 6 the dose of "Elixir Phenobarbital" was reduced to one drachm daily and the methylated spirits swabbing was discontinued. The findings on blood examination were within the limits of normality. The hæmoglobin value by the Sahli method was estimated to be 80%, the red cell count was 5,250,000 and the white cell count was 7,500 cells per cubic millimetre; no abnormal red cells or basophile or eosinophile leucocytes were seen in the film; 55% of the leucocytes were polpmorphonuclear (7% immature forms), 42% lymphocytes (15% large forms), and the remaining 3% were mononuclear cells. The hair was improving rapidly.

On June 10, 1936, she weighed 13·18 kilograms (twenty-nine pounds five and a half ounces) and was not at all irritable; she was looking about quite freely and did not cry or become emotional at the meeting.

Dr. Graham said that he thought that the child's illness was unquestionably due to pink disease and that he would like to draw attention to a number of features of interest. In the first place, the age at the onset was two years and seven months, and she had made great clinical improvement in one month. Dr. A. Jeffreys Wood, in 1921, had indicated that the prognosis as to duration was worse for older children. Secondly, the drowsiness was present in the early stages—the child used to ask to be put to bed. The creaking of the joints and the patches of erythema urticaria were noteworthy, as was the discovery of thread worms or of pin worms in a mucous stool. Finally, rapid improvement had followed the introduction of raw egg, raw potato juice and raw liver juice into the diet; this dietary was based on the experimental work of Boas (1927) and of Findlay, Marshall and Stern (1929). Dr. Graham thought that it was possible that a vitamin other than the known vitamin might be present in these articles, and that, as the patient shown by Dr. Graham was by no means the only one who had responded promptly when these articles were added to the diet, he still thought that these facts might have an important bearing on the ætiology of the disease. He asked his colleagues to test the matter clinically and to report their findings.

Dr. Robert Southby said that he still adhered to the view that pink disease might be due to a virus infection and that, just as with poliomyelitis or *herpes zoster*, they

encountered various degrees of severity, the patient shown by Dr. Graham might have been suffering from a mild infection which would account for the unduly rapid response to treatment. He was afraid that the patients did not all recover in this gratifying manner.

Dr. Ian Wood said that he endorsed the diagnosis of pink disease and was very interested to hear such a full description of the occurrence of the disease in so old a child. It was of interest that there were very few cases on record in patients over the age of three years; his father's oldest example was three and a half years of age. Authorities in France had reported the occurrence in older subjects; he had translated in 1933 a book written by C. Rocaz in 1931, entitled *"L'Acrodynie Infantile"*, in which reference was made to two important cases occurring at the age of eleven years and fourteen years respectively; dry, brittle hair was mentioned as a symptom, and an analogy was drawn between pink disease and *encephalitis lethargica*, with special reference to inversion of sleep.

(To be continued.)

Correspondence.

THE TECHNIQUE OF BRONCHOGRAPHY.

Sir: Whilst congratulating my colleague, Dr. John O'Sullivan, on his attempt to devise a simple method of per-tracheal injection of lipiodol, I think that his enthusiasm is misdirected. His problem is an economic one and amounts to this: "How can the radiologist perform bronchography without the added fee of a laryngologist?"

In 1929 I introduced to the Melbourne Hospital the per-nasal per-tracheal catheter method, as taught to me by Haslinger. My instructor spent 95% of the time in teaching how to anæsthetize a larynx efficiently, and the remainder of the time in introducing a catheter. This method and any other method will break down with inefficient anæsthesia. Recently I have introduced a catheter with complete comfort on a patient who described a previous effort as a most distressing affair.

Dr. O'Sullivan claims for his method a saving of time and trouble; no new instrument can provide a short cut to complete anæsthesia which takes 15 to 20 minutes to obtain; the passage of the per-nasal per-tracheal catheter takes less than sixty seconds. Radiologists can solve the difficulty by learning to handle a laryngeal mirror, which is essential in order to obtain anæsthesia of the larynx.

Haslinger's four stages may be enumerated as follows:

1. The palate and pharynx are sprayed or painted with anæsthetic.
2. With the patient's tongue held protruded, an anæsthetic swab or brush is held in each pyriform fossa for about sixty seconds. (The adjacent superior laryngeal nerves are affected much more by a contact swab than by a spray.)
3. The patient holds the tongue out; the operator uses a laryngeal mirror with the left hand, and with the right the epiglottis and arytenoid eminences are painted with anæsthetic.
4. The laryngeal brush is held between the vocal cords until the cough reflex is abolished.

Stage 4 provides the test of "complete anæsthesia"; once this is satisfied, it matters little how a catheter is introduced, whether with Dr. O'Sullivan's tube, with a Jackson's introducer, or by the simple per-nasal route.

Reverting to the economic problem of eliminating the fee of a laryngologist, the Alfred Hospital group has intensified the problem by insisting on preliminary bronchoscopy before the majority of bronchographies.

Yours, etc.,

T. G. Millar.

Ear, Nose and Throat Department,
Melbourne Hospital,
September 26, 1936.

Obituary.

JOHN REGINALD DAVIS.

The death of Dr. John Reginald Davis has already been recorded in these pages. He graduated with honours in the University of Melbourne in 1908 and became resident medical officer at Saint Vincent's Hospital, Melbourne, in the same year. After practising for a year or two in New South Wales, he went to Port Melbourne to take up practice. He was officer of health at Port Melbourne from 1915 to 1925. He was interested in diseases of children and for twelve years served as clinical assistant at the Children's Hospital, Carlton. In 1925 he was practising at Armadale, Victoria, and he also did some consulting practice in Collins Street. He was not robust and always worked to the limit of his strength. In 1935 it became apparent that he would have to find less strenuous work. He therefore moved to Westbury, Tasmania, and courageously continued his activities until a few days before his death. While getting out of his motor car he fractured his femur and was unable to survive the shock. Those who knew him speak of his devotion to his profession and his maintenance of its ideals; he was often sought in consultation by his brother practitioners, and, though he was sparing of words, he was always of help to them.

Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

The undermentioned have been registered, pursuant to the provisions of *The Medical Act*, 1912 *and* 1915, of New South Wales, as duly qualified medical practitioners:

Coles, Jack Lewis, M.B., 1936 (Univ. Sydney), Bellevue Park Road, Woollahra.
Cumming, Gordon David, M.B., B.S., 1936 (Univ. Sydney), 42, Victoria Parade, Manly.
Everingham, Clarence, M.B., B.S., 1936 (Univ. Sydney), 184, Walker Street, North Sydney.
Foulsham, Wallace George, M.B., 1936 (Univ. Sydney), Manly District Hospital, Manly.
Frost, Alan Dudly Joseph, M.B., B.S., 1936 (Univ. Sydney), 16, Birriga Road, Bellevue Hill.
Jones, Leonore Edith, M.B., B.S., 1936 (Univ. Sydney), "Trelawny", 50, Glasgow Avenue, Bondi.
McManis, Arthur Geoffrey, M.B., B.S., 1936 (Univ. Sydney), 55, Ashley Street, Chatswood.
Simons, Philip Neville, M.B., B.S., 1936 (Univ. Sydney), 4, "The Grosvenor", Wyuna Road, Point Piper.
Spence, Olaf McClure, M.B., 1936 (Univ. Sydney), 1, Church Street, Singleton.
Stevens, Thomas George, M.B., B.S., 1890, M.D., 1892 (London), M.R.C.P., 1896 (London), F.R.C.S., 1895, 88, O'Connor Street, Haberfield.
Williams, Jenkyn Lawrence Kenneth, M.B., B.S., 1936 (Univ. Sydney), "Glen Laure", Farquhar Street, Newcastle.
Denneen, Alan Thirlwall, M.B., B.S., 1936 (Univ. Sydney), Fisher Avenue, Vaucluse.

QUEENSLAND.

The undermentioned have been registered, pursuant to the provisions of *The Medical Acts*, 1925 *to* 1933, of Queensland, as duly qualified medical practitioners:

Booth, Frederick John, M.B., B.Ch., B.A.O., 1931 (Belfast), M.D., 1935 (Belfast), Brisbane.

Gordon, Neil Acheson, M.B., 1933, B.S., 1936 (Univ. Sydney), Stanthorpe.
Lawrie, Charles Malcolm, M.B., B.S., 1927 (Univ. Sydney), Brisbane.
Lee, Douglas Harry Kedgwin, M.B., 1929, B.S., 1930, D.T.M., 1933 (Univ. Sydney), Brisbane.
Martin, Norman William, M.B., Ch.B., 1932 (Univ. New Zealand), Brisbane.

Additional qualification:

Fryberg, Abraham, D.P.H., D.T.M., 1936 (Univ. Sydney), Brisbane.

Diary for the Month.

OCT. 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.
OCT. 13.—Tasmanian Branch, B.M.A.: Branch.
OCT. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
OCT. 20.—Tasmanian Branch, B.M.A.: Council.
OCT. 20.—New South Wales Branch, B.M.A.: Ethics Committee.
OCT. 21.—Western Australian Branch, B.M.A.: Branch.
OCT. 22.—New South Wales Branch, B.M.A.: Clinical Meeting.
OCT. 23.—Queensland Branch, B.M.A.: Council.
OCT. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
OCT. 28.—Victorian Branch, B.M.A.: Council.
OCT. 29.—South Australian Branch, B.M.A.: Branch.
OCT. 29.—New South Wales Branch, B.M.A.: Branch.
NOV. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
NOV. 3.—Tasmanian Branch, B.M.A.: Council.
NOV. 4.—Western Australian Branch, B.M.A.: Council.
NOV. 4.—Victorian Branch, B.M.A.: Branch.
NOV. 5.—South Australian Branch, B.M.A.: Council.
NOV. 6.—Queensland Branch, B.M.A.: Branch.
NOV. 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
NOV. 10.—Tasmanian Branch, B.M.A.: Branch.

Medical Appointments.

Dr. A. R. Southwood and Dr. E. A. Johnson have been appointed Members of the Advisory Committee under the provisions of the *Food and Drugs Act of* 1908, of South Australia.

* * *

Dr. W. C. Huggart has been appointed Government Medical Officer at Bullahdelah, pursuant to the provisions of the *Medical Act*, 1912 *and* 1915, of New South Wales.

* * *

Dr. D. O. Shiels, Dr. E. J. Ryan and Dr. F. F. Pincus have been appointed members of the Medical Board, under the provisions of *The Workers' Compensation (Lead Poisoning, Mount Isa) Act of* 1933, of Queensland.

* * *

Dr. J. E. Bateman has been appointed Honorary Clinical Assistant to the Vaccine and Asthma Clinic of the Adelaide Hospital, Adelaide.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xvi and xvii

HORNSBY AND DISTRICT HOSPITAL, HORNSBY, NEW SOUTH WALES: Honorary Assistant Surgeon.
LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer.
STATE PUBLIC SERVICE, QUEENSLAND: Medical Superintendent.
THE BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Honorary Physician.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

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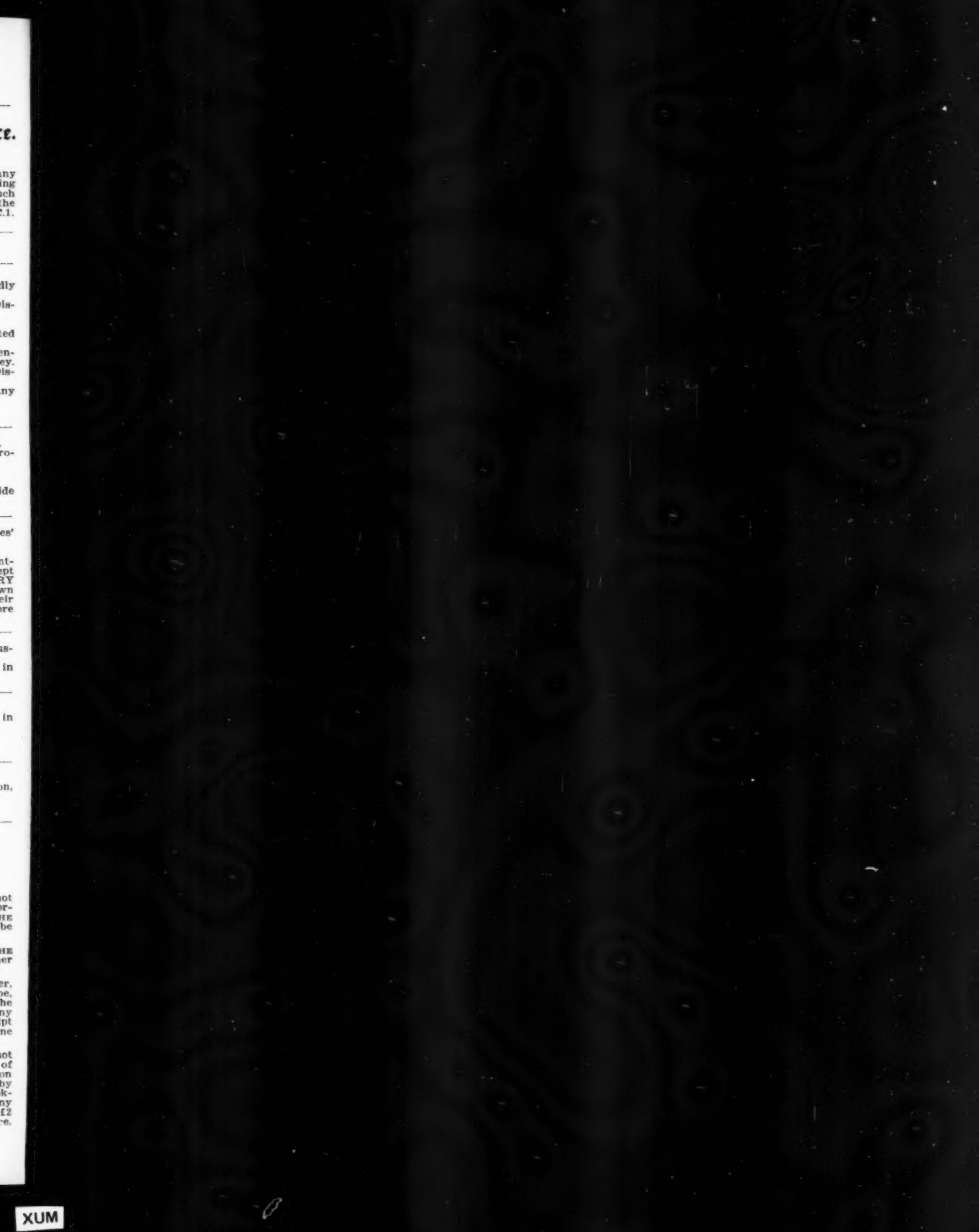
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